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1                                  LISTING OF CLAIMS

2      CLAIMS:

3      What is claimed is:

4      1.      (Original) A method for imparting a watermark onto a
5      digitized image, said method comprising:

6          providing a digitized image having at least one image plane,
7          said image plane being represented by an image array having
8          a plurality of pixels, said pixel having at least one color
9          component, said watermark being formed using a distinct
10         watermarking plane represented by an array having a
11         plurality of distinct watermarking elements, each of said
12         distinct watermarking elements having an array position and
13         having one-to-one positional correspondence with said image
14         pixels, and

15         multiplying said brightness data associated with said at
16         least one color component by a predetermined brightness
17         multiplying factor, wherein said brightness multiplying
18         factor is a corresponding distinct watermarking element, and
19         said watermark has a invisibility classification.

20     2.      (Original) A method as recited in claim 1, wherein said
21     brightness multiplying factor has a relationship with a number
22     taken from a random number sequence.

23     3.      (Original) A method as recited in claim 2, wherein said
24     relationship is a linear remapping to provide a desired
25     modulation strength.

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1    4.    (Original) A method as recited in claim 3, wherein said
2    modulation strength lies in the domain greater than or equal to
3    zero and less than or equal to 0.5.

4    5.    (Original) A method for imparting a watermark onto a
5    digitized image comprising the steps of:

6         providing said digitized image comprised of a plurality of
7         pixels, wherein each of said pixels includes brightness data
8         that represents a brightness of at least one color; and

9         altering said brightness data associated with a plurality of
10        said pixels maintaining the hue and saturation of said
11        pixel.

12   6.    (Original) A method as recited in claim 5, wherein said
13   image has I rows and J columns, and has a pixel in row i and
14   column j having at least one brightness, $Y(i,j)$, and the step of
15   altering includes:

16   adding to or subtracting from the brightness $Y(i,j)$ a different
17   small random value $e(i,j)$, wherein $1 \leq i \leq I$ and $1 \leq j \leq J$ are
18   the row and column indices of a pixel location in the image.

19   7.    (Original) A method as recited in claim 6, wherein the step
20   of adding to or subtracting from includes making $e(i,j)$
21   proportional to an original brightness of the pixel.

22   8.    (Original) A method as recited in claim 6, wherein color
23   components of the unaltered pixel are $X(i,j)$, $Y(i,j)$, and $Z(i,j)$,
24   and color components of the brightness altered pixel are $X'(i,j)$,
25   $Y'(i,j)$, and $Z'(i,j)$, and the step of adding to or subtracting
26   from includes setting $e(i,j) = d(i,j)Y(i,j)$, where $d(i,j)$ is a

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1  value selected from an array of random values within a range of 0

2  $\leq d(i,j) \leq 1$, such that the modified brightness $Y'(i,j) =$

3  $Y(i,j)+e(i,j) = Y(i,j)+d(i,j)Y(i,j)$, and $X'(i,j)/X(i,j) =$

4  $Z'(i,j)/Z(i,j) = Y'(i,j)/Y(i,j) = e(i,j) = 1-d(i,j)$.

5  9.    (Original) A method as recited in claim 8, wherein the step

6  of setting includes preserving ratios of color components in each

7  pixel.

8  10.    (Original) A method as recited in claim 9, wherein the step

9  of preserving includes setting $X'(i,j)/X(i,j) = Z'(i,j)/Z(i,j) =$

10  $Y'(i,j)/Y(i,j) = 1-d(i,j)$, wherein the color components of the

11  unaltered pixel are $X(i,j)$, $Y(i,j)$, and $Z(i,j)$, and the color

12  components of the brightness altered pixel are $X'(i,j)$, $Y'(i,j)$,

13  and $Z'(i,j)$.

14  11.    (Original) A method for imparting a watermark onto a

15  digitized image comprising the steps of:

16      providing said digitized image comprised of a plurality of

17      pixels, wherein each of said pixels includes brightness data

18      that represents a brightness of at least one color, with

19      said image having I rows and J columns, and a pixel in row i

20      and column j having a brightness $Y(i,j)$; and

21      for a plurality i and at least one j adding to or

22      subtracting from the brightness $Y(i,j)$ a random value

23      $e(i,j)$, wherein $1 \leq i \leq I$ and $1 \leq j \leq J$ are the row and

24      column indices of a pixel location in the image.

25  12.    (Original) A method as recited in claim 11, wherein $e(i,j)$

26  is in the domain 0 to 1 multiplied by $Y(i,j)$.

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1    13. (Original) A method for generating a watermarked image, the
2    method comprising:

3        imparting a watermark onto a digitized image having a
4        plurality of original pixels, each of said pixels having at
5        least one original pixel brightness value;

6        providing said digitized watermarking plane comprising
7        a plurality of watermarking elements, each element
8        having a watermark brightness multiplying factor and
9        having one-to-one positional correspondence with said
10       original pixels; and

11       producing a watermarked image by multiplying said
12       original brightness of each of said original pixels by
13       said brightness multiplying factor of a corresponding
14       one of said watermark elements.

15   14. (Original) A method comprising:

16   forming a watermarking plane including a plurality of elements
17   each having a brightness adding or subtracting factor, including
18   the steps of:

19       generating a secure random sequence of integers having
20       a first plurality of bits;

21       linearly remapping said random sequence to form a
22       remapped sequence of brightness multiplying factors to
23       provide a desired modulation strength;

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1    computing a discrete Fourier transform of said remapped
2    sequence to form a Fourier sequence having frequency
3    coordinates;

4    expanding said frequency coordinates to form an
5    expanded sequence;

6    computing an inverse discrete Fourier transform of said
7    expanded sequence to obtain a watermarking sequence of
8    values; and

9    deriving said brightness adding or subtracting values
10   of said elements of said watermarking plane based upon
11   said watermarking sequence of values.

12   15. (Original) A method for detecting a watermark in a marked
13   image, said method comprising:

14   providing said marked image marked by a watermarking plane,
15   said marked image having at least one color plane including
16   a plurality of image pixels, said watermarking plane having
17   a plurality of watermarking elements, wherein each of said
18   image pixels has at least one brightness value and each of
19   said watermarking elements has a brightness adding and/or
20   subtracting factor, including the steps of:

21   (a) reconstructing said watermarking plane;

22   (b) aligning said watermarking plane with said marked
23   image such that each watermarking element has a
24   corresponding image pixel;

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1    (c) providing a selector array and a visualizer image
2    of equal size, wherein said selector array has a
3    plurality of selector elements each having at least one
4    counter, and wherein said visualizer image has a
5    plurality of visualizer pixels each having at least one
6    brightness value, and wherein said visualizer pixels
7    represent a recognizable pattern when displayed;

8    (d) resetting said at least one counter to zero;

9    (e) placing said selector in an initial position by
10   aligning said selector elements with a plurality of
11   corresponding image pixels and a plurality of
12   corresponding watermarking elements;

13   (f) choosing a selector element and identifying a
14   corresponding watermarking element;

15   (g) identifying a first plurality of watermarking
16   elements that neighbor said corresponding watermarking
17   element;

18   (h) generating a first average that represents an
19   average of brightness multiplying factors of said first
20   plurality of watermarking elements;

21   (i) choosing a color plane of said marked image and
22   finding a corresponding image pixel;

23   (j) identifying a first plurality of neighboring pixels
24   that neighbor said corresponding image pixel;
25

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1     (k) generating a second average that represents an
2     average of brightness values of said first plurality of
3     neighboring pixels;

4     (l) updating said at least one counter based upon first
5     and second comparison operations, wherein said first
6     comparison operation compares said first average with
7     said brightness multiplying factor of said
8     corresponding watermarking element and said second
9     comparison operation compares said second average with
10    said brightness value of said corresponding pixel;

11    (m) repeating steps (i) through (l) for all color
12    planes;

13    (n) repeating steps (f) through (m) for all selector
14    elements;

15    (o) choosing a new selector position that does not
16    overlap any previous selector position;

17    (p) repeating steps (f) through (o) for all
18    non-overlapping selector positions; and

19    (q) generating a visual representation indicating
20    detection of said watermark in said marked image
21    utilizing said at least one counter of said selector
22    array and said visualizer pixels.

23    16.    (Withdrawn)   A method for detecting a watermarking plane
24    comprising the steps of:

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1       providing an image having a plurality of image pixels,
2   u(i,j), with said image having I rows and J columns, and a pixel
3   in row i and column j having at least one component, marked by a
4   watermarking plane; said watermarking plane having a plurality of
5   watermarking elements, w(i,j), with said watermarking plane
6   having I rows and J columns, and an element in row i and column j
7   having a brightness multiplying factor;
8       aligning said watermarking plane with said image;

9       identifying a subset of said image elements;

10      for each pixel, u(i,j), of said subset of image pixels,

11          generating a first value representing a relationship
12          between an attribute of said pixel u(i,j) and an
13          attribute of image pixels that neighbor said pixel
14          u(i,j);

15          identifying a watermarking element, w(i,j), that
16          corresponds to said pixel u(i,j) and watermarking
17          elements that correspond to said image pixels that
18          neighbor said image pixel u(i,j);

19          generating a second value representing a relationship
20          between an attribute of said watermarking element
21          w(i,j) and an attribute of the identified watermarking
22          elements; and

23          generating a coincidence value representing a
24          likelihood that said image is marked by said
25          watermarking plane based upon said first and second
26          values.

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1    17.    (Original) A method as recited in claim 1, wherein said
2    distinct watermarking element, has a value being in the domain
3    greater than or equal to zero and less than or equal to one.

4    18. (Withdrawn) A method for imparting a watermark onto a
5    digitized image comprising the steps of:

6         providing said digitized image comprised of a plurality
7         of image pixels with said digitized image having I rows
8         and J columns, and a pixel in row i and column j having
9         at least one component, $Y(i,j)$; and

10        adding to or subtracting from said brightness data
11        associated with at least one of said pixels a
12        predetermined brightness adding factor in the range of
13        0 to $Y(i,j)$, or brightness subtracting factor in the
14        range of 0 to $Y(i,j)$.

15   wherein said brightness adding or subtracting factor has a
16   relationship with a number taken from a random number sequence,
17   said relationship is a linear remapping to provide a desired
18   modulation strength, and said modulation strength is less than or
19   equal to 50 percent.

20   19. (Withdrawn) A method for imparting a watermark onto a
21   digitized image comprising the steps of:

22        providing said digitized image comprised of a plurality
23        of image pixels with said image having I rows and J
24        columns, and a pixel in row i and column j having at
25        least one component, $Y(i,j)$; and

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1       adding to or subtracting from said brightness data
2       associated with at least one of said pixels by a
3       predetermined brightness adding or subtracting factor
4       in the range of 0 to Y(i,j),

5   wherein said brightness adding or subtracting factor has a
6   relationship with a number taken from a random number sequence,
7   said relationship is a linear remapping to provide a desired
8   modulation strength, said sequence is formed from a plurality of
9   robust watermarking parameters, and said parameters comprise a
10  cryptographic key, two coefficients and an initial value of said
11  random number generator.

12  20.    (Withdrawn) A method for detecting a watermark, said method
13  comprising:

14  providing a marked image having a plurality of image pixels said
15  marked image being marked by a watermarking plane, having a
16  plurality of watermark elements;

17  aligning said watermarking plane with said marked image, and

18  generating a coincidence value by averaging a detection
19  coincidence for each selector element of a group of selector
20  elements taken from said image pixels.
21
22  21.    (Withdrawn) A method as recited in claim 20, wherein each
23  of said group of selector elements has a selector size, said
24  method further comprising:

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1   providing a visualizer pattern having a plurality of visualizer
2   pixels and a visualizer size equal to said selector size, each of
3   said visualizer pixels being associated with one of said selector
4   elements and having a visualizer color; and

5   displaying a watermark detection pattern having a size at least
6   equal to said visualizer size and a plurality of
7   visualizer-coincidence pixels, wherein each of said
8   visualizer-coincidence pixels is associated with a corresponding
9   selector element and a corresponding visualizer pixel, and each
10  of said visualizer-coincidence pixels being displayed having said
11  visualizer color when said coincidence value of said
12  corresponding selected element has an indication of a detection
13  success and having another color otherwise.

14  22.    (Withdrawn) A method as recited in claim 20 wherein said
15  watermark is based on a factor multiplying a brightness value of
16  each of said image pixels.

17  23.    (Withdrawn) A method as recited in claim 20, further
18  comprising:

19  reconstructing said watermarking plane used in generating said
20  watermark.
21
22  24.    (Withdrawn) A method as recited in claim 23, wherein said
23  watermarking plane has a plurality of watermarking elements, said
24  method further comprising:

25  rotating, resizing and said image to bring it to a size and
26  position of an original image, and

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1  aligning said watermarking plane with said marked image such that
2  each of said watermarking elements has a corresponding image
3  pixel.


4  25.    (Withdrawn) A method as recited in claim 20, wherein each
5  said group contains 128 elements.


6  26.    (Withdrawn) A method as recited in claim 20, wherein each
7  pixel of said image pixels has a monochrome brightness value.


8  27.    (Withdrawn) A method as recited in claim 20, wherein said
9  watermarking plane is generated using a plurality of robust
10 watermarking parameters.


11 28.    (Withdrawn) A method as recited in claim 20, wherein said
12 coincidence variable is determined using a statistically related
13 attribute relating each said selector element to a plurality of
14 neighboring elements.


15 29.    (Withdrawn) A method as recited in claim 28, wherein said
16 attribute is a brightness value.
17
18 30.    (Withdrawn) A method for detecting a watermark imparted on
19 an image, said method comprising:


20 providing said image having at least one image plane, said image
21 plane being represented by an image array having a plurality of
22 image elements, said watermark being formed using a watermarking
23 plane represented by a watermarking array having a plurality of
24 watermarking elements, each of said watermarking elements having
25 a first array position and having one-to-one positional
26 correspondence with said image elements;


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1    computing a first statistically related variable for each element
2    of at least one first grouping of a first selector array of
3    elements taken from said image elements, wherein each of said
4    image elements has a second array position;

5    computing a second statistically related variable for each
6    element of at least one second grouping of a second selector
7    array of elements taken from said watermarking elements, wherein
8    each element of said second selector array of elements has
9    one-to-one positional correspondence with said first selector
10   array, and wherein said correspondence forms combinations of
11   corresponding elements;

12   comparing to determine an affirmative and non-affirmative
13   likeness of said first and second statistically related variables
14   for each of said combinations of corresponding elements; and

15   forming at least one comparison array having one-to-one
16   correspondence with said at least one first grouping and having a
17   plurality of comparison elements, wherein each of said comparison
18   elements contains a positive detection indication for each
19   element of said first grouping when said step of comparing
20   results in an affirmative likeness, and a negative detection
21   indication for each element of said first grouping when said step
22   of comparing results in a non-affirmative likeness.

23   31.   (Withdrawn) A method as recited in claim 30, wherein said
24   watermark is formed by adding or subtracting a brightness factor
25   of each of said image elements by an amount contained in a
26   corresponding element of said watermarking elements.

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1   32.   (Withdrawn) A method as recited in claim 30, wherein said
2   first grouping corresponds to a selector positioned to encompass
3   said first selector array of elements forming a rectangular
4   cluster of elements.


5   33.   (Withdrawn) A method as recited in claim 30, wherein said
6   first statistical variable is formed by comparing an attribute of
7   said each element of said first selector array of elements to an
8   average attribute of its 128 closest neighbors.


9   34.   (Withdrawn) A method as recited in claim 30, wherein said
10  attribute is a ratio of the color component to the average of
11  neighboring color components in the same color plane. (Withdrawn)
12


13  35.   (Withdrawn) A method as recited in claim 30, wherein each
14  of said at least one first grouping is positioned so as not to
15  overlap any other of said at least one first grouping.
16

17  36.   (Withdrawn) A method as recited in claim 30, wherein each
18  said comparison elements has a particular position in said
19  comparison array, said method further comprising:


20  determining an average percentage of said affirmative and
21  non-affirmative likeness of each element of said comparison
22  elements having a same particular position in all arrays of said
23  at least one comparison array, and


24  forming a detection array of elements having one-to-one element
25  correspondence with said comparison elements, wherein each
26  element of said detection array of elements contains said average
27  percentage.

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1    37.    (Withdrawn) A method as recited in claim 36, further
2    comprising the steps of:

3    providing a visualizer pattern of pixels represented by an array
4    having visualizer pixels which have one-to-one element
5    correspondence with said detection array, each of said visualizer
6    pixels has a first logical value if a corresponding visualizer
7    pixel is black, and a complementary logical value if said
8    corresponding pixel is white;

9    forming a visualizer coincidence image having a plurality of
10   coincidence pixels, wherein a coincidence pixel has a
11   corresponding visualizer pixel and a corresponding detection
12   array element; and

13   setting said coincidence pixel to black if both said
14   corresponding visualizer pixel is black and said percentage
15   average of said corresponding detection array element has a value
16   greater than a predetermined detection threshold, otherwise
17   setting said coincidence pixel to white.

18   38.    (Withdrawn) A method as recited in claim 30, wherein said
19   image has three color planes.

20   39.    (Withdrawn) A method comprising generating a visual
21   representation of a data array of data elements having a data
22   array size, including the steps of:

23       providing a visualizer pattern of visualizer pixels
24       represented by a visualizer array of visualizer pixels, said
25       visualizer array having a visualizer array size equal to
26       said data array size;

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1   forming a visualizer-coincidence image of image pixels
2   represented by an image array having an image array size
3   equal to said visualizer array size;

4   setting each said visualizer-coincidence pixel to the color
5   of said corresponding visualizer pixel if a value of said
6   corresponding data element is above a predetermined
7   threshold and to another color if said value is below said
8   predetermined threshold; and

9   displaying said visualizer-coincidence image to form said
10  visual representation.

11  40. (Withdrawn) A method as recited in claim 39, wherein said
12  data array represents data resulting from a watermark detection
13  implementation.

14  41. (Withdrawn) A method as recited in claim 39, wherein said
15  first color is black and said second color is white.

16  42. (Withdrawn) A method as recited in claim 39, wherein said
17  threshold is set at a fifty percent success rate.

18  43. (Withdrawn) A method for demonstrating an existence of a
19  watermark in a marked image, said image having a plurality of
20  image pixels, said method comprising:

21  providing a visualizer pattern represented by an array of
22  visualizer elements, each of said visualizer elements
23  corresponding with one pixel of a plurality of visualizer pixels
24  and having a first value if said one pixel has a first color and
25  a second value if said one pixel has a second color, said
26  visualizer array having a visualizer array size;

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1   implementing a watermark detection scheme and computing a
2   coincidence value for each of said image pixels within a
3   plurality of pixel selector arrays taken from among said image
4   pixels, each of said pixel selector arrays having a selector
5   array size equal to said visualizer array size;
6
7   forming a detection array from a plurality of coincidence values,
8   wherein said detection array has a detection array size equal to
9   said visualizer size; and

10  computing a coincidence detection value for each of said
11  visualizer elements such that said detection value represents a
12  visualizer.

13  44. (Withdrawn) A method for detecting a watermark in a marked
14  image having a plurality of image pixels, said marked image
15  marked by a watermarking plane having a plurality of watermarking
16  elements, said method comprising:

17  providing a visualizer pattern having a plurality of visualizer
18  pixels and a visualizer size;

19  aligning said watermarking plane with said marked image such that
20  each said image pixel has a corresponding watermarking element;

21  generating a statistically related variable for each image
22  element in a plurality of groupings of image elements in
23  relationship with said corresponding watermarking element;
24  wherein each of said groupings has a grouping size equal to said
25  visualizer size;

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1    averaging said variable for each element in a like position of
2    all of said groupings to obtain a composite detection success
3    value; and

4    displaying detection success values by a plurality of
5    visualizer-coincidence pixels having a size equal to said
6    visualizer size, each said visualizer-coincidence pixel having a
7    same color as said corresponding visualizer pixel when said
8    corresponding success value indicates detection success and
9    another color otherwise.

10    45. (Currently amended) A computer program product comprising a
11    computer usable medium having computer readable program code
12    means embodied therein for causing a watermark to be imparted
13    into an image, the computer readable program code means in said
14    computer program product comprising computer readable program
15    code means for causing a computer to effect the steps of ~~claim 1~~:
16         providing a digitized image having at least one image plane,
17         said image plane being represented by an image array having
18         a plurality of pixels, said pixel having at least one color
19         component, said watermark being formed using a distinct
20         watermarking plane represented by an array having a
21         plurality of distinct watermarking elements, each of said
22         distinct watermarking elements having an array position and
23         having one-to-one positional correspondence with said image
24         pixels, and

25    _____ multiplying said brightness data associated with said at
26         least one color component by a predetermined brightness
27         multiplying factor, wherein said brightness multiplying
28         factor is a corresponding distinct watermarking element, and
29         said watermark has a invisibility classification.

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1   46. (Currently amended) A computer program product comprising a
2   computer usable medium having computer readable program code
3   means embodied therein for causing a watermark to be imparted
4   into an image, the computer readable program code means in said
5   computer program product comprising computer readable program
6   code means for causing a computer to effect the steps of~~claim 5~~:

7        providing said digitized image comprised of a plurality of
8        pixels, wherein each of said pixels includes brightness data
9        that represents a brightness of at least one color; and

10       altering said brightness data associated with a plurality of
11       said pixels maintaining the hue and saturation of said
12       pixel.

13   47. (Currently amended) A computer program product comprising a
14   computer usable medium having computer readable program code
15   means embodied therein for causing a watermark to be imparted
16   into an image, the computer readable program code means in said
17   computer program product comprising computer readable program
18   code means for causing a computer to effect the steps of ~~claim 11~~
19   :

20       providing said digitized image comprised of a plurality of
21       pixels, wherein each of said pixels includes brightness data
22       that represents a brightness of at least one color, with
23       said image having I rows and J columns, and a pixel in row i
24       and column j having a brightness Y(i,j); and

25       for a plurality i and at least one j adding to or
26       subtracting from the brightness Y(i,j) a random value
27       e(i,j), wherein $1 \leq i \leq I$ and $1 \leq j \leq J$ are the row and
28       column indices of a pixel location in the image.

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1    48. (Currently amended) A computer program product comprising a
2    computer usable medium having computer readable program code
3    means embodied therein for causing generation of a watermarked
4    image, the computer readable program code means in said computer
5    program product comprising computer readable program code means
6    for causing a computer to effect the steps of ~~claim 13~~:

7         imparting a watermark onto a digitized image having a
8         plurality of original pixels, each of said pixels having at
9         least one original pixel brightness value;

10        providing said digitized watermarking plane comprising
11        a plurality of watermarking elements, each element
12        having a watermark brightness multiplying factor and
13        having one-to-one positional correspondence with said
14        original pixels; and

15        producing a watermarked image by multiplying said
16        original brightness of each of said original pixels by
17        said brightness multiplying factor of a corresponding
18        one of said watermark elements.

19   49. (Currently amended) A computer program product comprising a
20   computer usable medium having computer readable program code
21   means embodied therein for causing formation of a watermarking
22   plane, the computer readable program code means in said computer
23   program product comprising computer readable program code means
24   for causing a computer to effect the steps of ~~claim 14~~:

25   forming a watermarking plane including a plurality of elements
26   each having a brightness adding or subtracting factor, including
27   the steps of:

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1       generating a secure random sequence of integers having
2       a first plurality of bits;

3       linearly remapping said random sequence to form a
4       remapped sequence of brightness multiplying factors to
5       provide a desired modulation strength;

6       computing a discrete Fourier transform of said remapped
7       sequence to form a Fourier sequence having frequency
8       coordinates;

9       expanding said frequency coordinates to form an
10      expanded sequence;

11      computing an inverse discrete Fourier transform of said
12      expanded sequence to obtain a watermarking sequence of
13      values; and

14      deriving said brightness adding or subtracting values
15      of said elements of said watermarking plane based upon
16      said watermarking sequence of values.

17      50. (Currently amended) An article of manufacture comprising a
18      computer usable medium having computer readable program code
19      means embodied therein for causing detection of a watermark in a
20      marked image, the computer readable program code means in said
21      article of manufacture comprising computer readable program code
22      means for causing a computer to effect the steps of claim 15:

23      providing said marked image marked by a watermarking plane,
24      said marked image having at least one color plane including
25      a plurality of image pixels, said watermarking plane having

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1      a plurality of watermarking elements, wherein each of said
2      image pixels has at least one brightness value and each of
3      said watermarking elements has a brightness adding and/or
4      subtracting factor, including the steps of:

5      (a) reconstructing said watermarking plane;

6      (b) aligning said watermarking plane with said marked
7      image such that each watermarking element has a
8      corresponding image pixel;

9      (c) providing a selector array and a visualizer image
10     of equal size, wherein said selector array has a
11     plurality of selector elements each having at least one
12     counter, and wherein said visualizer image has a
13     plurality of visualizer pixels each having at least one
14     brightness value, and wherein said visualizer pixels
15     represent a recognizable pattern when displayed;

16     (d) resetting said at least one counter to zero;

17     (e) placing said selector in an initial position by
18     aligning said selector elements with a plurality of
19     corresponding image pixels and a plurality of
20     corresponding watermarking elements;

21     (f) choosing a selector element and identifying a
22     corresponding watermarking element;

23     (g) identifying a first plurality of watermarking
24     elements that neighbor said corresponding watermarking
25     element;

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1    (h) generating a first average that represents an
2    average of brightness multiplying factors of said first
3    plurality of watermarking elements;

4    (i) choosing a color plane of said marked image and
5    finding a corresponding image pixel;

6    (j) identifying a first plurality of neighboring pixels
7    that neighbor said corresponding image pixel;
8    _

9    (k) generating a second average that represents an
10   average of brightness values of said first plurality of
11   neighboring pixels;

12   (l) updating said at least one counter based upon first
13   and second comparison operations, wherein said first
14   comparison operation compares said first average with
15   said brightness multiplying factor of said
16   corresponding watermarking element and said second
17   comparison operation compares said second average with
18   said brightness value of said corresponding pixel;

19   (m) repeating steps (i) through (l) for all color
20   planes;

21   (n) repeating steps (f) through (m) for all selector
22   elements;

23   (o) choosing a new selector position that does not
24   overlap any previous selector position;

25   (p) repeating steps (f) through (o) for all
26   non-overlapping selector positions; and

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1          (g) generating a visual representation indicating
2          detection of said watermark in said marked image
3          utilizing said at least one counter of said selector
4          array and said visualizer pixels.

5     51. (Withdrawn) An article of manufacture comprising a computer
6     usable medium having computer readable program code means
7     embodied therein for causing detection of a watermark in a marked
8     image, the computer readable program code means in said article
9     of manufacture comprising computer readable program code means
10    for causing a computer to effect the steps of claim 16.

11    52. (Withdrawn) An article of manufacture comprising a computer
12    usable medium having computer readable program code means
13    embodied therein for causing generation of a visual
14    representation of a data array of data elements, the computer
15    readable program code means in said article of manufacture
16    comprising computer readable program code means for causing a
17    computer to effect the steps of claim 39.

18    53. (Withdrawn) An article of manufacture comprising a computer
19    usable medium having computer readable program code means
20    embodied therein for causing a watermark to be imparted onto a
21    digitized image, the computer readable program code means in said
22    article of manufacture comprising computer readable program code
23    means for causing a computer to effect the steps of claim 18.

24    54. (Withdrawn) An article of manufacture comprising a computer
25    usable medium having computer readable program code means
26    embodied therein for causing a watermark to be imparted onto a
27    digitized image, the computer readable program code means in said

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1  article of manufacture comprising computer readable program code
2  means for causing a computer to effect the steps of claim 19.

3      55. (Withdrawn) An article of manufacture comprising a computer
4  usable medium having computer readable program code means
5  embodied therein for causing detection of a watermark imparted
6  onto a digitized image, the computer readable program code means
7  in said article of manufacture comprising computer readable
8  program code means for causing a computer to effect the steps of
9  claim 20.

10     56. (Withdrawn) An article of manufacture comprising a computer
11  usable medium having computer readable program code means
12  embodied therein for causing detection of a watermark in a marked
13  image, the computer readable program code means in said article
14  of manufacture comprising computer readable program code means
15  for causing a computer to effect the steps of claim 30.

16     57. (Currently amended and Withdrawn) An article of manufacture
17  comprising a computer usable medium having computer readable
18  program code means embodied therein for causing generation of a
19  visual representation of a data array of data elements, the
20  computer readable program code means in said article of
21  manufacture comprising computer readable program code means for
22  causing a computer to effect the steps of claim 39 40.

23     58. (Withdrawn) An article of manufacture comprising a computer
24  usable medium having computer readable program code means
25  embodied therein for causing demonstration of an existence of a
26  watermark in a marked image, the computer readable program code
27  means in said article of manufacture comprising computer readable
28  program code means for causing a computer to effect the steps of
29  claim 43.

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1   59. (Withdrawn) A computer program product comprising a computer
2   usable medium having computer readable program code means
3   embodied therein for causing detection of a watermark in a marked
4   image, the computer readable program code means in said computer
5   program product comprising computer readable program code means
6   for causing a computer to effect the steps of claim 44.

7   60.     (Original) An apparatus to impart a watermark onto a
8   digitized image, said apparatus comprising mechanisms for
9   implementing the method of claim 1.

10   61.     (Original) An apparatus for imparting a watermark onto a
11   digitized image comprising mechanisms for implementing the method
12   of claim 5.

13   62.     (Original) An apparatus for imparting a watermark onto a
14   digitized image comprising mechanisms for implementing the method
15   of claim 6.

16   63.     (Original) An apparatus for imparting a watermark onto a
17   digitized image comprising mechanisms for implementing the method
18   of claim 11.

19   64. (Original) A method for detecting a watermark in a marked
20   image, said method comprising:

21   providing said marked image having said watermark;

22   altering said marked image employing a blurring filter in
23   producing a filtered image; and

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1   employing a watermark detection method upon said filtered image
2   to detect said watermark.

3   65. (Original) A method for detecting a watermark in a marked
4   image, said method comprising:

5   providing said marked image having said watermark;

6   processing the marked image and producing a screened image;

7   altering said screened image employing a blurring filter in
8   producing a filtered image; and

9   employing a watermark detection method upon said filtered image
10  to detect said watermark.

11  66. (Original) A method as recited in claim 65, wherein the step
12  of processing includes producing a derivative image by screening,
13  printing and scanning the marked image.

14  67. (Original) A method as recited in claim 15, wherein the step
15  of aligning includes altering said marked image employing a
16  blurring filter.

17  68. (Withdrawn) A method as recited in claim 16, wherein the step
18  of aligning includes altering said marked image employing a
19  blurring filter.

20  69. (Withdrawn) A method as recited in claim 20, wherein the step
21  of aligning includes altering said marked image employing a
22  blurring filter.

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1   70. (Withdrawn) A method as recited in claim 30, wherein the step
2   of providing includes altering said marked image employing a
3   blurring filter.

4   71. (Withdrawn) A method as recited in claim 44, wherein the step
5   of aligning includes altering said marked image employing a
6   blurring filter.

7   72. (Withdrawn) An article of manufacture as recited in claim 51,
8   wherein the step of aligning includes altering said marked image
9   employing a blurring filter.

10  73. (Withdrawn) An article of manufacture as recited in claim 59,
11  wherein the step of aligning includes altering said marked image
12  employing a blurring filter.

13  74. (Original) An apparatus as recited in claim 61, wherein the
14  means of providing includes means for altering said marked image
15  employing a blurring filter.

16  75. (Withdrawn)    A method of generating a visual
17  representation of a data array of data elements having a data
18  array size, said method comprising:

19  providing a visualizer pattern of visualizer pixels represented
20  by a visualizer array of visualizer elements, said visualizer
21  array having a visualizer array size equal to said data array
22  size, wherein each of said visualizer elements has a first
23  logical value if a corresponding visualizer pixel is a first
24  color and a complementary logical value if said corresponding
25  visualizer pixel has a second color;

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1    forming a data image of image pixels represented by an image
2    array having an image array size equal to said data array size,
3    wherein an image pixel has a corresponding data element and a
4    corresponding visualizer pixel;

5    setting said data pixel to a color of said corresponding
6    visualizer pixel if a value of said data element is above a
7    predetermined threshold and to another color if said value is
8    below said predetermined threshold; and
9
10   displaying said data image to form said visual representation.

11   76. (Withdrawn) A method as recited in claim 75, wherein said
12   data array represents data resulting from a watermark detection
13   implementation.

14   77. (Withdrawn) A method as recited in claim 75, wherein said
15   first color is black and said second color is white.

16   78. (Withdrawn) A method as recited in claim 75, wherein said
17   threshold is set at a fifty percent success rate.

18   79. (Withdrawn) An article of manufacture comprising a computer
19   usable medium having computer readable program code means
20   embodied therein for causing generation of a visual
21   representation of a data array of data elements, the computer
22   readable program code means in said article of manufacture
23   comprising computer readable program code means for causing a
24   computer to effect the steps of claim 75.

25   80. (Withdrawn) A computer program product comprising a computer
26   usable medium having computer readable program code means
27   embodied therein for causing generation of a visual

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1    representation of a data array of data elements, the computer

2    readable program code means in said computer program product

3    comprising computer readable program code means for causing a

4    computer to effect the steps of claim 75.


5    81. (Original) An apparatus for generating a watermarked image

6    comprising mechanisms for implementing the method of claim 13.


7    82. (Original) An apparatus comprising mechanisms for

8    implementing the method of claim 14.


9    83. (Original) An apparatus for detecting a watermark in a marked

10   image comprising mechanisms for implementing the method of claim

11   15.


12   84. (Withdrawn) An apparatus for detecting a watermarking plane

13   comprising mechanisms for implementing the method of claim 16.


14   85. (Withdrawn) An apparatus for imparting a watermark onto a

15   digitized image comprising mechanisms for implementing the method

16   of claim 19.


17   86. (Withdrawn) An apparatus for detecting a watermark comprising

18   mechanisms for implementing the method of claim 20.


19   87. (Withdrawn) An apparatus for detecting a watermark comprising

20   mechanisms for implementing the method of claim 30.


21   88. (Withdrawn) An apparatus for demonstrating an existence of a

22   watermark in a marked image comprising mechanisms for

23   implementing the method of claim 43.

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1    89. (Withdrawn) An apparatus for detecting a watermark comprising
2    mechanisms for implementing the method of claim 44.

3    90. (Withdrawn) A method for detecting a watermarking plane
4    comprising the steps of:

5        providing an image having a plurality of image pixels,
6    u(i,j), with said image having I rows and J columns, and a pixel
7    in row i and column j having at least one component, marked by a
8    watermarking plane; said watermarking plane having a plurality of
9    watermarking elements, w(i,j), with said watermarking plane
10   having I rows and J columns, and an element in row i and column j
11   having a brightness multiplying factor;

12       aligning said watermarking plane with said image;

13       identifying a subset of said image elements; and

14       for each pixel, u(i,j), of said subset of image pixels,
15       employing a detection scheme in determining a probability of
16       watermark detection based on a property of uniform
17       distribution of the random brightness multiplying factors or
18       the random brightness adding or subtracting factors.

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